underpinned publication" of this book, says Aitken.

Most of the illustrations Aitken depicts show the artists' love of detail: the structure of the veins of the leaf, the relation of the leaf to the stem and the arrangement of the seeds in the pod, and everything to do with the composition of the flower.

From the subtitle of the book, you might expect a collection of anecdotes but the book is more like an overview of the whole history of botanical exploration and its intersection with the age of the great global empires, with a few anecdotes thrown in.

He highlights the eventual economic importance of some of these floral forays. Some parts of the world yielded an extraordinary number of food plants — so large that it is hard to imagine the cuisine of India before it received such Central and Southern American contributions as the chilli or the tomato.

But he also highlights other reactions. Considering the distinctiveness of the Australian flora, it is surprising that early British and French botanists were disappointed at what they found. Aitken comments: "A perceived lack of edible plants was commonly cited, yet this belied the rich array of 'bush tucker' plants that had sustained Australia's Aboriginals for thousands of years."

But the strength of this book lies in its illustrations, which bring us close to, but do not include the age of photography. It is interesting that photography has its weaknesses as a method of illustrating botany. It is still the case that an artist may be a more helpful guide.

"Botanical Riches is thus a vehicle for bringing this rich legacy to wider notice and in so doing to share the joy of these plants and their depiction with new audiences," writes Aitken. "In many cultures... there is a pleasing conjunction between plants and their images."

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Q & A

Jean-Paul Vincent

Jean-Paul Vincent got his first degree in applied physics from the University of Louvain in Belgium. He then obtained a Fulbright fellowship for postgraduate studies in biophysics at the University of California, Berkeley. His thesis showed that the dorso-ventral axis of frog embryos is specified by the so-called subcortical rotation in the egg. From Berkeley, he moved across the bay to the University of California, San Francisco, for postdoctoral training with Pat O'Farrell. There, in collaboration with O'Farrell and Tim Mitchison, he devised the first cell-lineage tracer based on caged dye technology. In 1993, he started is own research group at the Laboratory of Molecular Biology in Cambridge (UK) where he developed his interest in epithelial patterning. He moved to his present job at the National Institute for Medical Research in Mill Hill in 1997. His work there has shown that degradation of Wingless, an important signalling molecule, is developmentally regulated. He continues to investigate Wingless trafficking, and also has an interest in the maintenance of epithelial organisation during embryogenesis.

What turned you on to biology in the first place? Biology was not considered a serious subject by the school I attended in Belgium. The emphasis was on formal maths and physics, and this is what I took as an undergraduate. I enjoyed the neat beauty of these two subjects but longed to learn biology as well, because it encompasses phenomena that are amazing and yet still governed by the laws of physics and chemistry. I wish that I could have had an undergraduate education that covered equally physics, biology, chemistry and applied maths. I also wish that my maths and physics education had had a more intuitive slant (as tends to be the case in the US) instead of overvaluing abstract mathematical thinking (which seemed to be the only yardstick of intelligence in Belgium and France). My world opened dramatically when I went to UC Berkeley. I had the idea of studying photosynthesis from a solid-state physicist's point of view, but as I took various undergraduate courses, I became exposed to a vast array of fascinating biological processes. I then met George Oster, who convinced me that there are interesting fluid dynamics in a frog egg.

Do you have a favourite paper? Being the product of a rather hierarchical European education system, I was surprised when soon after my arrival at Berkeley, professors were seeking my opinion on research projects. But when John Gerhart, who later became my advisor, asked me to summarise a classic 182-page French paper — Ancel, P. and Vintemberger, P. (1948) *Recherche sur le déterminisme de la symétrie bilatérale dans l'oeuf des amphibians*. Bull. Biol. Fr. Bel. Suppl. *31*, 1–182 — I thought I could contribute something useful (not knowing of course that John was fluent in French). Clearly it is not a very succinct paper, but it was an endless source of facts, puzzles and inspiration throughout my thesis work.

I also have a least-favourite paper: *Control of sequential compartment formation in Drosophila.* (1978) Science *199*, 259–270. It is a modeling paper that I first read before I knew much biology. I was then enthralled by its beauty. I only found out later that it had no connection with reality and felt cheated.

What advice would you offer someone who is starting a career in biology? The most difficult aspect of research is to identify a good problem to investigate. The classical literature is full of problems and observations waiting to be re-examined under a new light. Confirmation and extension of the original observation with modern techniques is a good way to ensure immediate productivity and to prepare the terrain for good

hypothesis-driven research. I still relish the time when, as a naïve Ph.D. student, I was unaware of fashion and the need to please top journals. This allowed me to follow compulsively one aim, which I had convinced myself to be worthwhile. Other pieces of advice are to keep career plans flexible enough to allow collaborators to influence one's research direction and to synergise with local expertise.

Is there any quality that you wish you had more of?
Self-confidence is an important trait when naïveté has worn off. Once a decision is made to follow up on a project, one must persist long enough to see its potential (or unforeseen limitation). On more than one occasion, I failed to follow valid avenues of research because I could not overcome naysayers' comments or because I did not trust my own judgement. One cannot wait for the approval of most peers. Of course, it is important to know when to give up a doomed project. In this respect, having close friends, colleagues or mentors who are constructively critical is invaluable.

What is your favourite conference? The EMBO Workshop on the Molecular and Developmental Biology of *Drosophila*, held in Crete every two years. This meeting is elitist and egalitarian at the same time. Only 100 applicants can attend — they are selected from a pool of applicants by a rotating committee — but once there, everyone speaks for just 12 minutes. Talks often report emerging areas of research on a wide diversity of subjects, including cell biology, developmental biology, neurobiology and innate immunity. The atmosphere is both relaxed (with plenty of wine and sea views) and pressured (many sharp minds attend). Of course one cannot live off *Drosophila* and wine alone, and I value highly my colleagues who work with other model organisms.

Do you have a scientific hero?
My scientific heroes are my three mentors, John Gerhart, George Oster and Pat O'Farrell. They are at the same time creative and intellectually rigorous. Also they really care about their collaborators as human beings and as scientists with professional aspirations.

Do you have any qualms about the fact that the pursuit you enjoy is funded by public money? I do at times, but such anxieties are easily allayed when I am reminded that basic science provides the essential foundation on which improvements in public health are based. There is a current push to increase translational research at the expense of basic research. It would be more effective to my mind to make sure that career structures allow the free movement of people from one to the other.

Name one big challenge for developmental biology?
Developmental biology has uncovered most of the regulatory pathways that control cell-fate decisions. How these pathways control cell behaviour and hence morphogenesis remains largely unknown. Many genes that are regulated by these pathways are being identified. The challenge is to build an integrated picture of how these effector genes drive specific morphogenetic events at the cellular and tissue level.

Is mathematical modelling in developmental biology a tool or a fad? As biology is becoming more quantitative, mathematical modelling features increasingly in biology papers. This trend extends to phenomena that are still poorly quantified, for example morphogen transport. Models are useful because they tell us the realm of what is physically possible but they are also limited when validation is hampered by poor quantitative knowledge of all the relevant parameters — receptor levels, binding constants, and so on. Measuring these parameters *in vivo* is an essential prerequisite even though it is not viewed as very glamorous.

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Quick guide

ESCRTs

Lene Malerød and Harald Stenmark

First discovered... Endosomal sorting complex required for transport (ESCRT)-I was discovered and characterized biochemically in 2001, and two functionally related complexes, ESCRT-II and -III, were described the following year. However, almost all of the individual subunits had been discovered earlier through yeast genetic screens for vacuolar protein sorting (*vps*) mutants. Among the multiple *vps* mutants identified to date, those lacking functional ESCRT subunits belong to the so-called 'class E' group, which is characterized by a large multilamellar endosome, the 'class E compartment'.

What do they look like? ESCRT-I consists of equimolar amounts of the subunits Vps23, Vps28 and Vps37. The carboxyl terminus of Vps23 together with the amino-terminal half of Vps28 and carboxy-terminal end of Vps37 build the core of ESCRT-I, which resembles a fan. The ubiquitin-binding amino terminus of Vps23 protrudes from the core via a long arm. ESCRT-II is Y-shaped and consists of one subunit of Vps22, two of Vps25 and one of Vps36. ESCRT-III is made of two subcomplexes, one containing Vps2 and Vps24 and the other containing Vps32 and Vps20. All the ESCRT-III members are small coiled-coil proteins that have a basic amino terminus and an acidic carboxyl terminus and assemble as higher-order multimers on membranes.

Can we live without them?
Certainly not. The ESCRTs are conserved from yeast to man and have essential functions in higher eukaryotes as evidenced by the embryonic lethality of mice that lack ESCRT subunits.